Exelon Nuclear

10CFR50.73

August 23, 2010

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 1
Facility Operating License No. NPF-39
NRC Docket No. 50-352

Subject: LER 2010-001-00, Valid Actuation of the Reactor Protection System With the Reactor Critical

This Licensee Event Report (LER) addresses a valid actuation of the reactor protection system when the reactor was critical. The event was due to a failure of a 13 kV cable, failure of an undervoltage auxiliary relay, and a failure of a reactor recirculation pump M-G set standby lube oil pump relay that resulted in a trip of both reactor recirculation pumps which required a manual initiation of the reactor protection system. The north stack ventilation exhaust wide range accident monitor also failed during the initial electrical distribution voltage transient which later resulted in a condition prohibited by Technical Specifications.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A) and 10CFR50.73(a)(2)(i)(B).

There are no commitments contained in this letter.

If you have any questions, please contact John Hunter III at (610) 718-3400.

Respectfully,

Original signed by

William F. Maguire
Vice President - Limerick
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC
E. M. DiPaolo, USNRC Senior Resident Inspector, LGS

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE: Valid Actuation of the Reactor Protection System With the Reactor Critical

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	23	2010	2010	- 001 -	00	08	23	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER *(Include Area Code)*
John G. Hunter III, Manager – Regulatory Assurance	610-718-3400

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	EA	CBL5	A385	Y	B	EA	27	W120	Y
B	AD	RLY	T009	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

A valid manual actuation of the reactor protection system was initiated due to an automatic trip of both reactor recirculation pumps. The event was caused by a failure of a 13 kV cable that powered a non-safeguard 480 VAC load center, a failure of a load center control power undervoltage auxiliary relay to automatically provide control power to the adjacent load center and a failure of a reactor recirculation pump M-G set standby lube oil pump relay. The faulted 13 kV cable section has been replaced but has not been energized. The failed undervoltage auxiliary relay has been replaced. The failed reactor recirculation pump M-G set standby lube oil pump relay was replaced. The north stack ventilation exhaust wide range accident monitor also failed due to the initial electrical distribution voltage transient. The radiation monitor has been repaired and returned to service.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A) (17)*

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. D14 Emergency Diesel Generator was out of service for maintenance at the time of the event. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On Wednesday June 23, 2010 Limerick Unit 1 was operating at 100% power. At 2051 hours, a valid manual actuation of the reactor protection system (RPS) (EIIS:JC) was initiated as directed by the Recirculation Pump Trip procedure (OT-112) due to an automatic trip of both reactor recirculation pumps (RRP) (EIIS:AD) following a loss of main generator stator cooling water (EIIS:TJ). The event was caused by a failure of a 13 kV cable (EIIS:CBL5) that supplies electrical power to the 144D non-safeguard 480 VAC load center transformer, a failure of the 114A/124A load center control power undervoltage auxiliary relay (EIIS:RLY) to automatically provide control power to 124A load center and a failure of a reactor recirculation pump M-G set standby lube oil pump relay. The 13 kV breaker (EIIS:BKR) that tripped was the supply to 114A and 144D load centers.

The operators entered the TRIP procedure for reactor pressure vessel (RPV) control (T-101) and stabilized reactor parameters. The operators verified that all control rods were fully inserted.

Reactor level initially decreased to a minimum of -5 inches and increased to a maximum of +42 inches. The +54 inch high-level turbine trip setpoint was not exceeded. The reactor level of less than +12.5 inches resulted in an isolation signal to the closed Group IIB valves as expected.

Reactor pressure initially decreased from 1044 psig to approximately 1039 psig, then increased and stabilized at approximately 1042 psig. Reactor pressure remained less than the lowest safety relief valve (SRV) setpoint of 1170 psig; therefore, no SRVs actuated. The main steam bypass valves opened as designed to control pressure.

The loss of 114A load center de-energized the power supply to the operating stator cooling water pump and the operating reactor recirculation M-G set lube oil pumps. The standby stator cooling water pump did not automatically start due to a loss of control power to the 124A load center caused by an undervoltage auxiliary relay failure. The 124A load center remained energized during the event without control power for the supplied loads. The 1A RRP M-G Set tripped on a loss of lube oil due to a failure of the standby lube oil pump to start. This failure was due to a relay failure which preceded the stator cooling water runback trip. The 1B RRP M-G Set tripped on the stator cooling water runback as designed.

The post-scram troubleshooting identified a fault on the 13 kV cable supplying the 144D load center. The faulted cable section was replaced but has not been energized. The 114A and 144D load center 480 VAC loads were re-energized.

The post-scram troubleshooting also identified that 114A/124A load centers control power undervoltage auxiliary relay (27X) was failed. The failed undervoltage auxiliary relay has been replaced.

The north stack ventilation exhaust wide range accident monitor (WRAM) was rendered inoperable by the electrical distribution failure at the time of the scram which resulted in a loss of sample flow and a loss of indication. This WRAM failure was identified by the operators on Thursday June 24, 2010, at 0200 hours. The licensed operators entered the Technical Specification (TS) 3.3.7.5, Accident Monitoring Instrumentation, action 81 in Table 3.3.7.5-1, which requires restoration within 7 days. The licensed operators also entered the TS 3.3.2, Isolation Actuation Instrumentation, action "c" to place one trip system in the tripped condition within one hour and take the action required by Table 3.3.2-1. With both North Stack Effluent Radiation High trip systems inoperable, in Operational Condition 3, Table 3.3.2-1, action 23, requires being in at least Cold Shutdown within 12 hours. Cold Shutdown was achieved at 1350 hours which satisfied the TS action at that time. However, firm evidence was later identified that the WRAM was rendered inoperable on Wednesday June 23, 2010, at 2051 hours, for a period with the plant in OPCON 3, which exceeded the 12 hour TS action requirement. Therefore, the inoperable WRAM condition existed for a period of time longer than permitted by the TS.

A 4-hour NRC ENS notification was required by 10CFR50.72(b)(2)(iv)(B) for an actuation of RPS when the reactor was critical. An 8-hour NRC ENS notification was required by 10CFR50.72(b)(3)(iv)(A) for a valid actuation of RPS. The ENS notification (#46042) was completed on Wednesday June 23, 2010 at 2357 EDT. This event involved a manual actuation of RPS and a condition prohibited by TS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A) and 10CFR50.73(a)(2)(i)(B).

Analysis of the Event

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. A loss of both recirculation pumps transient is categorized as an incident of moderate frequency per the Updated Final Safety Analysis Report (UFSAR) section 15.3.1 Recirculation Pump Trip, subsection 15.3.1.1.2.2. The plant equipment performed as designed during the transient with the exception of the load center control power undervoltage auxiliary relay, the 1A RRP M-G

set standby lube oil pump relay and the WRAM. The operators effectively stabilized reactor parameters.

The 13 kV breaker that tripped was the normal supply to both 114A Generator Area Load Center and 144D Technical Support Load Center. The control power for the 114A and 124A load centers was de-energized when the 114A transformer tripped. The control power undervoltage auxiliary relay failed to automatically transfer the control power loads to the energized 124A load center control power transformer. The 124A load center remained energized without control power. The 114A load center trip de-energized the operating 1A Generator Stator Cooling Pump. The 1B Generator Stator Cooling Pump is powered from 124A load center and did not automatically start due to the loss of control power. This resulted in a loss of stator cooling water to the main generator.

The 1A RRP M-G Set tripped on a loss of lube oil due to a relay failure on the standby lube oil pump. The loss of stator cooling water tripped the 1B RRP M-G Set resulting in a loss of forced reactor coolant circulation. The operators initiated a manual actuation of RPS which inserted all the control rods.

Cause of the Event

The initiating event was a failure of a 13 kV cable power supply to a 480 VAC load center with a subsequent failure of a load center control power undervoltage auxiliary relay and a failure of a reactor recirculation pump M-G set standby lube oil pump relay. This caused both RRP M-G sets to trip which required a manual scram. The undervoltage auxiliary relay failure was caused by improper adjustment of the relay latching mechanism. The degraded relay was not identified since there was no routine testing or preventive maintenance on the undervoltage auxiliary relay. The standby lube oil pump relay failure occurred when contacts failed to reset as designed.

Corrective Action Completed

The faulted section of the 13 kV cable from the 13 kV breaker to the 144D load center transformer was replaced and tested. The energization of the repaired cable is pending.

The 114A and 144D load center 480 VAC loads were re-energized.

The failed load center control power undervoltage auxiliary relay and the failed standby lube oil pump relay were replaced.

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Corrective Action Planned

The other non-safeguard load centers with the same relay for control power undervoltage automatic transfer will be tested.

Preventive maintenance will be implemented on the non-safeguard load center control power undervoltage automatic transfer equipment.

Previous Similar Occurrences

There were no previous similar occurrences in the prior five years due to an electrical distribution failure.

Component data:

Cause: B (Design, Manufacturing, Construction/Installation)
System: EA (Medium Voltage Power System)
Component: CBL5 (Cable, Medium-Voltage Power)
Manufacturer: A385 (Anaconda Company)

Cause: B (Design, Manufacturing, Construction/Installation)
System: EA (Medium Voltage Power System)
Component: 27 (Relay, Undervoltage)
Manufacturer: W120 (Westinghouse)
Part#: 289B363A13

Cause: B (Design, Manufacturing, Construction/Installation)
System: AD (Reactor Recirculation System)
Component: RLY (Relay)
Manufacturer: T009 (Tyco)
Part#: 1423165-2